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Risk of Eating Disorders in Immigrant Populations

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Abstract

Objective: The risk of certain psychiatric disorders is elevated among immigrants. To date, no population studies on immigrant health have addressed eating disorders. We examined whether risk of eating disorders in first- and second-generation immigrants differ from native-born Danes and Swedes.

Method: All individuals born 1984-2002 (Danish cohort) and 1989-1999 (Swedish cohort) and residing in the respective country on their 10th birthday were included. They were followed up for the development of eating disorders based on outpatient and inpatient data.

Results: The risks of all eating disorder types were lower among first-generation immigrants compared to the native populations: Incidence-rate ratio (95% confidence interval) 0.39 (0.29, 0.51) for anorexia nervosa, 0.60 (0.42, 0.83) for bulimia nervosa, and 0.62 (0.47, 0.79) for other eating disorders in Denmark and 0.27 (0.21, 0.34) for anorexia nervosa, 0.30 (0.18, 0.51) for bulimia nervosa, and 0.39 (0.32, 0.47) for other eating disorders in Sweden. Likewise, second-generation immigrants by both parents were at lower risk, whereas those with only one foreign-born parent were not.

Conclusion: The decreased risk of eating disorders among immigrants is opposite to what has been observed for other psychiatric disorders, particularly schizophrenia. Possible explanations include buffering socio-cultural factors and underdetection in healthcare.

Keywords: *eating disorders, anorexia nervosa, bulimia nervosa, epidemiology, immigrants*

Significant Outcomes
First- and second-generation immigrants with two foreign-born parents had decreased risks of eating disorders compared to the native populations.
The risk-lowering effect of immigration did not extend to second-generation immigrants with only one foreign-born parent; those with a foreign-born father had an increased risk of eating disorder, whereas those with a foreign-born mother resembled native-born individuals.

Limitations
The data only comprise diagnosed individuals. We cannot determine to what extent the differences in eating disorder incidence rates are due to different treatment seeking or detection patterns.
The immigrant populations likely differ from native populations in a number of ways, and more finely-grained information regarding cultural and socioeconomic factors would be needed to determine the causal mechanisms of the observed associations.

Introduction

Two contrasting observations dominate our understanding of the relation between migration and mental health. On the one hand, immigrants may be at increased risk for psychiatric disorders, possibly due to traumatic events prior to migration, stress caused by migration, or adverse circumstances in the receiving country (1-3). On the other hand, some reports show that immigrant populations, particularly recent immigrants, have better mental health than the native populations of the receiving countries (4-6). This is commonly referred to as the "healthy immigrant effect" and could be caused by rigorous selection and screening of prospective immigrants or a lower prevalence of risk factors in the countries of origin (7, 8).

Migration as a risk factor for serious mental disorders is supported by a solid body of evidence showing increased incidence of schizophrenia among immigrants compared to native populations (2, 9-11). Discrimination and social defeat experienced by immigrants in their receiving countries have been suggested as possible explanations (2, 12, 13).

For common psychiatric disorders, such as mood and anxiety disorders, the evidence for effects of migration on mental health remains mixed. Population-based studies from the US have consistently shown lower prevalence of mood, anxiety, and personality disorders among immigrants than among native-born Americans (5, 6). Danish population data also showed lower incidence rates of affective and personality disorders among immigrants than native Danes (10). In contrast, two meta-analyses of population-based studies suggest an overall modest increase in risk of mood disorders in immigrants, although considerable heterogeneity existed across studies (14, 15). The seemingly conflicting findings across studies may be explained by the heterogeneous nature of immigrant populations. Circumstances surrounding the immigration, such as reasons for immigration (e.g., refugee status), country of origin, ethnic minority status, and social support networks within the immigrant communities, appear to be important determinants of mental health status among immigrants (3, 16).

None of the large studies on immigrant mental health have included eating disorders. Migration from regions with low eating disorder incidence to those of higher incidence may result in increases in eating disorder occurrence, as has been demonstrated for binge eating disorder in Mexican-Americans (17). Immigration itself and the accompanying culture change may increase susceptibility to expression of an array of psychopathology including eating disorders (18), as demonstrated by several reports on eating disorders triggered by immigration (17, 19-22). Yet, a protective effect of immigration on eating disorder occurrence was observed in children of Greek migrant workers to Germany, who scored lower on eating disorder symptoms than their peers residing in Greece (23, 24).

Assimilation is a multigenerational process whereby the immigrant population gradually starts to resemble the native population (25). It is relevant whether the mental health effects of immigrant status carry over to subsequent generations. This seems to be the case for schizophrenia, the risk of which is elevated both among first- and second-generation immigrants (9, 10). To date, no large-scale studies have examined the risk of eating disorders among first- or second-generation immigrants. Moreover, no previous study on immigrant health has combined data from two nation-wide population cohorts.

Aims of the Study

Our aim was to assess the risk of eating disorders in immigrant populations in relation to native-born individuals using two longitudinal total-population cohorts from Denmark and Sweden. Specifically, we explored whether the incidence rates of eating disorders differ between native-born Danes or Swedes and individuals with a background of foreign migration.

Material and methods

Study populations

Denmark

The Danish Civil Registration System (26) includes all individuals living in Denmark. Among other variables, it has information on date and place of birth, sex, and continuously updated information on place of residence and vital status. A personal identification number is used in all national registers enabling linkage between them.

Our Danish study population included all persons born between January 1, 1984 and December 31, 2002 who were alive and residing in Denmark on their 10th birthday and whose parents both resided in Denmark at that time (N=1,184,205). The study was approved by the Danish Data Protection Agency.

Sweden

We linked several nationwide registers maintained by government agencies and covering the total Swedish population (27) using the unique personal identification number given to all Swedish citizens. The use of these data has been approved by the regional ethical review board in Stockholm, Sweden.

We obtained data on birth year, sex, and country of birth from the Total Population Register and linked individuals to their biological parents using the Multi-Generation Register (28). Immigration and emigration data were obtained from the Migration Register, which includes information on all registered migration into or out of Sweden. The Cause of Death Register provides information on dates of all registered deaths.

Our Swedish study population included all persons born between January 1, 1989, and December 31, 1999 who were alive and resided in Sweden on their 10th birthday and whose parents both resided in Sweden at that time (N=1,222,593).

Assessment of Eating Disorders

Denmark

The Danish Psychiatric Central Register (29) contains data on all admissions to Danish psychiatric in-patient facilities. The Danish National Patient Register (30) contains data on all admissions to public hospitals in Denmark. In both registers, information on outpatient visits was included from 1995 onwards. From 1994, the diagnostic system used was the International Classification of Diseases, 10th revision, Diagnostic Criteria for Research (ICD-10-DCR). Cohort members were classified with an eating disorder if they had been admitted to a psychiatric or public hospital or had received outpatient care for any of the following: anorexia nervosa (ICD10: F50.0, F50.1), bulimia nervosa (ICD10: F50.2, F50.3), or other eating disorder (ICD10: F50.8, F50.9). For each eating disorder, the date of onset was defined as the first day of the first inpatient or outpatient contact. Multiple disorders were recorded if developed by the individual.

Sweden

Discharge diagnoses, anorexia nervosa (ICD10: F50.0, F50.1), bulimia nervosa (ICD10: F50.2, F50.3), or other eating disorder (ICD10: F50.9), from the National Patient Register (which provides data on all inpatient care since 1986 and the majority of outpatient care since 2001) were recorded according to the Swedish version of the International Statistical

Classification of Diseases and Related Health Problems, Tenth Revision (ICD-10) (1997 to present). In addition, eating disorder diagnoses classified according to the Diagnostic and Statistical Manual of Mental Disorders, 4th Edition (DSM-IV) were obtained from the Swedish National Quality Assurance Register for Specialized Eating Disorder Treatment (Riksät) (since 1999) and the Internet-based quality assurance system for eating disorders (Stepwise database, since 2005) (31).

Assessment of Foreign Migration Background

Foreign migration background was classified according to the person and his/her parents' country of birth as well as mother's country of residence at the time of the person's birth. Foreign migration background in both Denmark and Sweden included the following groups:

1) First-generation immigrants: Persons born abroad with both parents born abroad;
2) Second-generation immigrants by both parents foreign-born: Persons born in Denmark/Sweden with both parents born abroad;
3) Second-generation immigrants by foreign-born mother: Persons born in Denmark/Sweden with a mother born abroad;
4) Second-generation immigrants by foreign-born father: Persons born in Denmark/Sweden with a father born abroad;
5) Native Danes/Swedes: Persons born in Denmark/Sweden and whose parents both were born in Denmark/Sweden.

Additional categories recorded in Denmark only included: 6) Intercountry adoptees: individuals born abroad at the time when the legal mother was residing in Denmark; 7) Persons born to expatriates; and 8) Native Danes with foreign residence.

The classification of foreign migration background was identical to that used previously in Denmark (10). Individuals who could not be classified as above due to missing data counted 1.05% in Denmark and 0.34% in in Sweden.

Study Design and Statistical analysis

Individuals were followed up from their 10th birthday until eating disorder onset, death, emigration from Denmark/Sweden, or the end of the follow-up period (end of year 2013 in Denmark and end of year 2009 in Sweden), whichever came first. The starting years of the follow-up periods were determined based on the introduction of the ICD-10 in Denmark (1994) and establishment of the Riksät register in Sweden (1999). Because of the timeframe of the follow-up, findings were based entirely on incident cases diagnosed according to the ICD-10 and DSM-IV diagnostic classification systems.

The incidence rate ratios (IRRs) for each eating disorder were estimated by log linear Poisson regression (32). All IRRs were adjusted for calendar period and age. The pooled IRRs for males and females were further adjusted by sex and the interaction between age and sex. Age and calendar period were treated as time-dependent variables (33), whereas all other variables were treated as variables independent of time. P values and 95% confidence intervals (CIs) were based on likelihood ratio tests (33). The adjusted-score test (34) suggested that the regression models were not subject to over-dispersion.

Results

Descriptive Findings

Denmark

A total of 1,184,205 individuals born 1984-2002 were followed from their 10th birthday. More than 170 countries of foreign birth were represented; the most frequent countries of origin

were Iraq, Bosnia-Herzegovina, Afghanistan, Somalia, Lebanon, and Turkey. The cohort was followed for 11,913,958 person-years; the longest individual follow-up period was 20 years. Follow-up age ranged from 10 to 29 years. In Denmark, 9549 individuals (0.81%) received an eating disorder diagnosis during follow-up (1.54% of all women, n=8,864 and 0.11% of all men, n=685).

Sweden

A total of 1,222,593 persons born 1989-1999 were followed from their 10th birthday. Foreign migration background was recorded as one of twelve geographic regions; country-level information was not available. The most frequent areas of origin were Asia, Europe (excluding 25 EU countries and Scandinavia), South America, and Africa. The cohort was followed for a total of 7,201,805 person-years; the longest individual follow-up period was 11 years. Follow-up age ranged from 10 to 20 years. In Sweden, 6,539 individuals (0.54%) received an eating disorder diagnosis during follow-up (1.02% of all women, n=6,061 and 0.09% of all men, n=537).

Incidence Rate Ratios According to Foreign Migration Background

Figure 1 shows the IRRs for each eating disorder diagnosis and the pooled category "any eating disorder" according to foreign migration background compared with native Danes and Swedes in the whole study population (females and males combined). Stratified results for females and males are presented in Tables 1a and 1b (Denmark) and Tables 2a and 2b (Sweden).

Denmark

In the total study population and among females, the incidence rates of all eating disorder types were lowest among first-generation immigrants (Figure 1, Table 1a). Likewise, second-

generation immigrants by both parents had lower incidence of eating disorders than native Danes. In contrast, second-generation immigrants with a foreign-born father had significantly elevated incidence rates of all eating disorder types, whereas those with a foreign-born mother did not differ from native Danes in this respect. Foreign-born adoptees had elevated incidence rates of bulimia nervosa and other eating disorder.

Among males, the effects were in the same direction as among females, but estimates were imprecise due to the small number of male eating disorder cases. A statistically significant risk-lowering effect of immigrant status was seen for anorexia nervosa both among first-generation immigrants and second-generation immigrants by both parents (Table 1b).

Sweden

In the total study population and among females, the incidence rates of all eating disorder types were lower among first-generation immigrants compared with native Swedes (Figure 1, Table 2a). Similarly, second-generation immigrants by both parents were at lower risk, but the effect was weaker and did not quite reach statistical significance for bulimia nervosa. Second-generation immigrants with a foreign-born father had significantly elevated incidence rates of both bulimia nervosa and other eating disorders, whereas those with a foreign-born mother did not significantly differ from native Swedes.

Among males, the effects were in the same direction as among females, but estimates were imprecise due to the small number of cases. A statistically significant risk-lowering effect of immigrant status was seen for anorexia nervosa and any eating disorder among first-generation immigrants and for other eating disorder and any eating disorder among second-generation immigrants by both parents (Table 2b).

Discussion

We found that the risk of eating disorders was substantially lower among first-generation immigrants compared to the native populations. The decreased risk persisted in second-generation immigrants with both parents born abroad, but was not present in second-generation immigrants with only one foreign-born parent. Second-generation immigrant women with a native-born mother and a foreign-born father had elevated risk for some eating disorders in both Denmark and Sweden.

The decreased risk for eating disorders among immigrants is in keeping with what has previously been found for affective and substance use disorders in Denmark (10). Our results may partly reflect a general tendency for decreased occurrence of certain non-psychotic psychiatric disorders among immigrants, as also observed in the USA and Canada (4-6). However, the risk-lowering effect of immigrant status was much stronger for eating disorders than for any of the previously studied disorders. It was particularly strong for anorexia nervosa: being a first-generation immigrant or having two foreign-born parents more than halved the risk for anorexia nervosa.

Two not-mutually exclusive explanations could underlie the lower risk of diagnosed eating disorders among immigrants: First, the true incidence of eating disorders is lower among immigrants; second, the difference is due to lower detection or treatment seeking among immigrants.

The strong effect of immigrant status on eating disorder risk suggests that specific factors may buffer individuals in immigrant populations from eating disorders. Although eating disorders have biological underpinnings, they are culturally influenced disorders (35, 36). They are no longer considered to be limited to Western culture, but are tied to economic development, urbanization, and industrialization (35, 37). Despite reports of rising incidences particularly in

Asia (38, 39), eating disorders still appear rare in many low- and middle-income countries (35, 40). As the majority of immigration to Denmark and Sweden was from less developed countries, a low base rate of eating disorders in the countries of origin is one plausible explanation for the low rates among immigrants. Even if migration from regions with low eating disorder occurrence to those of higher occurrence may increase risk (17), it may still remain lower than that of the native population of the receiving countries.

The risk-lowering effect of immigrant status persisted but was weaker in second-generation immigrants. This is similar to what has been found for the increased risk of schizophrenia (9, 10) and the decreased risk of common psychiatric disorders (6, 10). That the effect carries over to the children of immigrant families suggests that socio-cultural factors likely contribute to the decreased risk. Such factors could include greater acceptance of larger body sizes (40, 46-50) or social support within the immigrant communities (1). Our results suggest that assimilation to the receiving countries increases the risk for eating disorders so that it starts approaching that of the native populations.

In addition to true differences in eating disorder incidence across immigrant groups, different treatment-seeking and detection patterns may have influenced our results. Only diagnosed cases are recorded in the registers, and community-based studies suggest that more than half of eating disorder cases go undetected and undiagnosed (41-44). Although the universal health insurance system in Scandinavia ensures equal access to care, factors such as language barriers, reluctance to seek psychological help outside of families and stigma associated with psychiatric illness (51), may decrease reporting of eating disorders and treatment seeking among immigrants. Therefore, underdetection of eating disorders in the healthcare (45) could contribute to the lower rates of diagnosed eating disorders among immigrants.

Cultural conflict has been suggested as one possible factor in the etiology of eating disorders (52). Because intermarriage is a part of the assimilation process (25), many second-generation immigrants grow up in families where one parent is native-born. These families may culturally resemble native population families, but may also experience unique challenges due to conflicting values, traditions, or communication styles (53). In our study populations, second-generation immigrants with one native-born parent were not protected from eating disorders. Rather, the risk was elevated among women with foreign-born fathers. Similar differences in risk patterns between second-generation immigrants with one vs. two foreign-born parents have been observed for other psychiatric disorders in Denmark (10). It seems that the risk-lowering effect of immigrant status on eating disorder risk does not extend to second-generation immigrants with only one foreign-born parent.

Strengths and limitations

The main strengths of our study are the large-scale prospective cohort design, the nationwide and a virtually complete coverage of the Danish and Swedish national registries, the inclusion of both inpatient and outpatient data, and the long follow-up which covered the peak incidence period (54) for eating disorders. That all participants were residing in Denmark/Sweden by their 10^{th} birthday, decreases the risk for bias due to selective migration of the individuals themselves. Further, restriction of the cohorts to individuals whose parents were alive and living in Denmark/Sweden eliminates potential bias due to differential rates of parental death in migrants or separation from parents due to parental foreign residence, events that could increase the risk for mental disorders (55).

Our study also has limitations. First, as mentioned above, our data only comprise diagnosed individuals. We cannot determine to what extent the differences in eating disorder rates are indicative of a true protective effect of immigrant status and to what degree they reflect

different treatment seeking or detection patterns. Second, the immigrant populations likely differ from native populations in a number of ways, and more finely-grained information regarding cultural and socioeconomic factors would be needed to determine the causal mechanisms of the observed associations. Third, our data only include eating disorders with onset before age 30 years in Denmark and 20 years in Sweden and the results cannot necessarily be generalized to eating disorders with later onset. In Sweden, our data did not cover individuals presenting for treatment in their early twenties, which may have overlooked a substantial number of cases of bulimia nervosa and other eating disorders, particularly (56). Unless substantial differences exist in age of onset or detection across the groups, this is unlikely to have influenced our results. Fourth, given that we compared immigrant populations to native populations of the receiving countries, we do not know how the occurrence of eating disorders compares to that of the migrants' countries of origin. Furthermore, immigrant populations are heterogeneous, and pooled estimates of effects across a diverse sample may fail to identify subgroup differences. Therefore, our results do not exclude the possibility that migration triggered eating disorders in some individuals or that the risk was increased in some immigrant groups.

In summary, by studying two large total-population prospective cohorts, we found that first-generation immigrants and second-generation immigrants with two foreign-born parents had decreased incidence rates of eating disorders as compared to the native populations. There may be socio-cultural factors that protect individuals in immigrant populations from eating disorders, particularly anorexia nervosa. However, lower treatment seeking or underdetection of eating disorders among immigrants is possible, and efforts should be made to identify and overcome barriers that immigrants may face in accessing mental healthcare.

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Figure legend

Figure 1. Incidence-rate ratios (IRR) and 95% confidence intervals for eating disorders in the different immigrant groups as compared to native Danes and Swedes. An IRR <1 indicates lower risk compared to native Danes/Swedes, whereas an IRR >1 indicates increased risk.

Table 1a. Denmark: Incidence Rate Ratio's (IRR)[a] for eating disorders according to immigration status among **females** born from 1984 to 2002 and residing in Denmark at the 10th birthday followed for development of eating disorders according to the ICD-10 classification using both in- and out-patient information (from 1994 to 2013)

	First-generation immigrant (N=12,692)	Second-generation immigrant by both parents (N=34,291)	Second-generation immigrant by mother only (N=19,773)	Second-generation immigrant by father only (N=21,698)	Foreign-born adoptee (N=5,207)	Persons born to expatriates (N=2,578)	Native Dane with foreign residence (N=6,575)	Native Dane (N=468,229)
Anorexia nervosa								
No of cases	43	105	135	204	55	22	60	4026
IRR (95% CI)	**0.40 (0.29-0.53)**	**0.42 (0.34-0.50)**	0.88 (0.73-1.04)	**1.18 (1.02-1.35)**	1.26 (0.95-1.62)	1.06 (0.67-1.57)	1.08 (0.83-1.38)	1.00 (1.00-1.00)
P value	<.0001	<.0001	0.12	0.025	0.11	0.80	0.56	.
Bulimia nervosa								
No of cases	35	60	88	158	40	17	28	2029
IRR (95% CI)	**0.62 (0.43-0.85)**	**0.57 (0.43-0.73)**	1.22 (0.98-1.50)	**1.97 (1.67-2.31)**	**1.77 (1.27-2.38)**	**1.74 (1.04-2.71)**	1.02 (0.68-1.44)	1.00 (1.00-1.00)
P value	0.0022	<.0001	0.077	<.0001	0.0011	0.037	0.93	.
Other eating disorder								
No of cases	50	113	131	178	63	20	39	3246
IRR (95% CI)	**0.57 (0.43-0.75)**	**0.57 (0.47-0.69)**	1.07 (0.89-1.27)	**1.30 (1.11-1.50)**	**1.78 (1.37-2.26)**	1.21 (0.75-1.82)	0.87 (0.63-1.18)	1.00 (1.00-1.00)
P value	<.0001	<.0001	0.46	0.0012	<.0001	0.42	0.39	.
Any Eating Disorder								
No of cases	102	232	286	425	124	47	101	7450
IRR (95% CI)	**0.50 (0.41-0.61)**	**0.52 (0.45-0.59)**	1.02 (0.90-1.15)	**1.36 (1.23-1.49)**	**1.53 (1.27-1.82)**	1.24 (0.92-1.63)	0.99 (0.81-1.19)	1.00 (1.00-1.00)
P value	<.0001	<.0001	0.74	<.0001	<.0001	0.16	0.89	.

Table 1b. Denmark: Incidence Rate Ratio's (IRR)[a] for eating disorders according to immigration status among **males** born from 1984 to 2002 and residing in Denmark at the 10th birthday followed for development of eating disorders according to the ICD-10 classification using both in- and out-patient information (from 1994 to 2013)

	First-generation immigrant (N=13,464)	Second-generation immigrant by both parents (N=35,550)	Second-generation immigrant by mother only (N=21,003)	Second-generation immigrant by father only (N=22,828)	Foreign-born adoptee (N=4,307)	Persons born to expatriates (N=2,654)	Native Dane with foreign residence (N=7,010)	Native Dane (N=493,933)
Anorexia nervosa								
No of cases	2	9	15	21	4	2	3	303
IRR (95% CI)	**0.25 (0.04-0.78)**	**0.45 (0.21-0.82)**	1.24 (0.71-2.01)	1.57 (0.98-2.38)	1.51 (0.47-3.54)	1.26 (0.21-3.93)	0.71 (0.17-1.84)	1.00 (1.00-1.00)
P value	0.012	0.0073	0.42	0.062	0.44	0.75	0.52	.
Bulimia nervosa								
No of cases	<3	<3	<3	<3	<3	<3	<3	48
IRR (95% CI)	n.a	n.a	n.a	n.a	n.a	n.a	n.a	1.00 (1.00-1.00)
P value	n.a	n.a	n.a	n.a	n.a	n.a	n.a	.
Other eating disorder								
No of cases	9	21	12	19	5	3	4	310
IRR (95% CI)	1.09 (0.52-1.98)	1.05 (0.65-1.59)	0.98 (0.52-1.67)	1.40 (0.85-2.16)	1.84 (0.66-3.99)	1.87 (0.46-4.89)	0.92 (0.28-2.16)	1.00 (1.00-1.00)
P value	0.81	0.83	0.95	0.18	0.22	0.33	0.87	.
Any Eating Disorder								
No of cases	9	27	22	34	9	4	6	564
IRR (95% CI)	0.60 (0.29-1.08)	0.74 (0.49-1.06)	0.99 (0.63-1.48)	1.37 (0.95-1.91)	1.82 (0.87-3.31)	1.37 (0.42-3.19)	0.76 (0.30-1.55)	1.00 (1.00-1.00)
P value	0.094	0.11	0.96	0.086	0.10	0.55	0.48	.

[a] All IRR's were adjusted for calendar year and age. The numbers in parenthesis indicate 95% confidence intervals. n.a=not applicable

Table 2a. Sweden: Incidence Rate Ratio's (IRR)[a] for eating disorders among **females** accordin status residing in Sweden at the 10th birthday followed for development of eating disorders.

	First-generation immigrant (N=37,763)	Second-generation immigrant by both parents (N=53,368)	Second-generation immigrant by mother only (N=27,367)	Second-generation immigrant by father only (N=33,140)	N (1
Anorexia nervosa					
No of cases	60	148	170	198	2
IRR (95% CI)	**0.25 (0.19-0.32)**	**0.53 (0.45-0.62)**	1.00 (0.86-1.17)	0.97 (0.84-1.12)	1
P value	<.0001	<.0001	0.98	0.64	.
Bulimia nervosa					
No of cases	14	37	43	56	5
IRR (95% CI)	**0.30 (0.18-0.52)**	0.78 (0.56-1.09)	**1.37 (1.01-1.87)**	**1.48 (1.13-1.96)**	1
P value	<.0001	0.14	0.046	0.01	.
Other eating disorder					
No of cases	91	215	168	250	2
IRR (95% CI)	**0.37 (0.30-0.45)**	**0.74 (0.64-0.85)**	0.96 (0.82-1.12)	**1.18 (1.03-1.34)**	1
P value	<.0001	<.0001	0.57	0.01	.
Any Eating Disorder					
No of cases	143	313	295	383	4
IRR (95% CI)	**0.34 (0.29-0.41)**	**0.65 (0.58-0.73)**	1.01 (0.89-1.13)	1.08 (0.97-1.20)	1
P value	<.0001	<.0001	0.91	0.14	.

[a]All IRR's were adjusted for calendar year and age. The numbers in parenthesis indicate 95% confidence

Table 2b. Sweden: Incidence Rate Ratio's (IRR)[a] for eating disorders among **males** according to immigration status residing in Sweden at the 10th birthday followed for development of eating disorders.

	First-generation immigrant (40,765 persons)	Second-generation immigrant by both parents (56,330 persons)	Second-generation immigrant by mother only (28,967 persons)	Second-generation immigrant by father only (34,405 persons)	Native Swedes (467,427 persons)
Anorexia nervosa					
No of cases	10	14	10	11	223
IRR (95% CI)	**0.52 (0.28-0.98)**	0.60 (0.35-1.03)	0.75 (0.40-1.41)	0.69 (0.37-1.26)	1.00 (1.00-1.00)
P value	0.04	0.06	0.37	0.23	.
Bulimia nervosa					
No of cases	0	0	0	0	9
IRR (95% CI)	n.a	n.a	n.a	n.a	1.00 (1.00-1.00)
P value	n.a	n.a	n.a	n.a	.
Other eating disorder					
No of cases	16	20	13	26	292
IRR (95% CI)	0.64 (0.39-1.06)	0.64 (0.41-1.01)	0.74 (0.43-1.29)	1.24 (0.82-1.87)	1.00 (1.00-1.00)
P value	0.08	0.054	0.29	0.32	.
Any Eating Disorder					
No of cases	24	28	21	31	433
IRR (95% CI)	**0.65 (0.43-0.97)**	**0.61 (0.41-0.89)**	0.81 (0.52-1.25)	1.00 (0.68-1.45)	1.00 (1.00-1.00)
P value	0.04	0.01	0.34	0.98	.

[a]All IRR's were adjusted for calendar year and age. The numbers in parenthesis indicate 95% confidence intervals. n.a=not applicable